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# **Human capital in the regions of the Russian Empire and inequality in land distribution at the turn of the 20<sup>th</sup> century**

**Vladimir Popov, Roman Konchakov, Dmitry Didenko**

## **ABSTRACT**

This paper is an empirical test of what is called a unified theory of inequality and growth (Galor and Zeira, 1988, 1993; Galor and Moav, 2004; Galor, 2012) – in early stages of industrialization inequality enhanced the process of development by channeling resources towards individuals whose marginal propensity to save is higher, thus enhancing physical and human capital accumulation. In later stages of development, however, equality has stimulated human capital formation and growth and unequal distribution of income became a hurdle for economic development.

A number of studies have found that human capital is higher and more evenly distributed in countries with lower income and wealth inequalities. In particular, Baten and Hippe (2018) argued that inequality in the distribution of land ownership in Europe (including Russia) in the 19<sup>th</sup> century had a negative impact on human capital formation (as measured by numeracy rate) as landowners did not have incentives to promote educational institutions or were not willing to pay the necessary taxes.

In contrast, we find that in the regions of Russian Empire in 1897 uneven distribution of land was associated with higher levels of human capital (as measured by the average years of schooling and literacy rate), whereas the distribution of the human capital across the regional population (as measured by literacy and the proportions of inhabitants with higher, secondary and primary education) was more even. The difference in the results is caused by the different measurements of land inequality; our result is totally consistent with the unified theory of the inequality and growth.

**Keywords:** educational attainment, school enrollment, inequality, land distribution, growth.

**JEL:** D63, I24, J24, N93, R11.

# **Human capital in the regions of the Russian Empire and inequality in land distribution at the turn of the XX century**

**Vladimir Popov, Roman Konchakov, Dmitry Didenko**

## **Introduction**

The most conventional link between human capital and inequality that is well studied in the literature is about how the inequality in education (human capital) results eventually in the inequality in income and wealth. If and when the returns to human capital are high, there are greater inequalities in income and wealth distribution.

There is also the inverse link – the influence of wealth and income inequalities on the level and the evenness of distribution of human capital. There are obvious externalities from education and knowledge (social returns from are higher than private returns), so the theory predicts that, if human capital is not treated as a public good and its formation is left to the market, there will be underinvestment into education and the rich would be better educated than the poor. Hence in unequal societies without free education, human capital would be lower, and the inequalities in the distribution of human capital across the population would be larger.

Given these direct and backward links, there is a possibility of self-propelled process with multiple (good and bad) equilibria. There may be a vicious circle: income and wealth inequalities => lower and more unevenly distributed human capital => more income and wealth inequalities. But there is also a chance for the virtuous circle, if the human capital formation is supported by the government (free education): higher and more evenly distributed human capital => lower inequalities in income and wealth => even less inequalities in human capital distribution.

The reasons for the market failure to ensure the optimal level of human capital may be different – credit constraints that do not allow poor individuals to borrow to make optimal investment into their own education; political economy reasons, for instance, state capture, prohibiting the government to support free education so as to compensate for the market failure – underinvestment into goods with

positive externalities (with social returns greater than private returns). And in the absence of government investment into education, there may be another link between inequality in wealth and incomes and human capital formation: rich individuals have higher savings rate than poor, so investment into physical and human capital are higher than in more egalitarian societies. The natural question is, of course, what are the actual links between human capital and income and wealth inequality.

This paper investigates the relationship between the inequality in land distribution and the level of human capital and its distribution across population using the dataset on the regions of the Russian Empire in the end of the 19<sup>th</sup> century. We find that inequalities in the distribution of land (the ratio of large to small land holdings) led to higher levels of human capital (as measured by the average years of schooling and literacy rate), whereas the distribution of the human capital across the regional population (as measured by literacy and the proportions of inhabitants with higher, secondary and primary education) was more even. We compare our results with the other studies that produced alternative estimates and analyze the reasons for the difference.

### **Literature review**

The large body of evidence exists to prove that uneven distribution of human capital across population is the source of inequalities in income and wealth (Becker and Chiswick 1966; Mincer 1974; Gregorio and Lee, 1999; Lee, J.-W. and H. Lee. 2018 – just to cite some studies). Cross-country comparisons found a basically positive relationship between educational attainment and income inequality (Castelló and Doménech, 2002; De Gregorio and Lee, 2002). Some studies (Földvári and Van Leeuwen, 2011) found a low impact of educational inequality on income inequality, especially in developing countries, but a stronger positive relationship in economically advanced nations. This may be due to the fact that efficiency of human capital utilization largely depends on its qualitative characteristics (which are difficult to measure) and on the institutional environment.

There is much less agreement about the impact of inequality in income and asset distribution on process of the formation of human capital. The dominant view today is that inequality harms growth

via different channels, in particular via the obstacles that it creates for the accumulation of human capital.

Some studies actually use the data on the distribution of assets instead of distribution of incomes. Easterly (2007) uses agricultural endowments as an instrument for inequality in cross-country regressions to deal with endogeneity and measurement issues, and finds that inequality has been a barrier to schooling and economic prosperity. Andersen (2015) argued that deficiencies arising from both capital market imperfections and social rigidities imply that inequality may be a barrier to education, which in turn makes inequality persistent and reduces growth. Deininger and Squire (1998) ran cross-country regressions to show that Gini coefficients of land distribution have significant adverse effect on education and economic growth.

Baten and Hippe (2018) used the indicator of numeracy measured via the age heaping method in Europe (including Russia) in the 19<sup>th</sup> century and compared it with the inequality in the distribution of land ownership (share of land plots of over 50 hectares in total land). They found a negative impact on human capital formation, arguing that the effect is due to the lack of incentives for the landowners to promote educational institutions or to pay the necessary taxes.

However, there is also a classical tradition to view inequality as conducive to the accumulation of physical and human capital at a low level of development because inequality raises saving rate at a low level of development. This is known as the Kaldor effect (Kaldor, 1955) – if marginal propensities to save increase with the growth of income, the increase in inequality will drive up savings and investment ratios, accumulation of physical and human assets and economic growth.

Popov (2014) argues that this was the major reason of the acceleration of growth in Western countries since the 16<sup>th</sup> century. Investment rate increased in Britain from 6% in 1760 to 12% in 1831, and productivity growth rates increased to 1% annually after being virtually zero for millenniums. Today the same effect is observed in less developed countries – Cook (1995) shows that regardless of the inequality measure employed, some sort of Kaldor effect may be at work in developing countries.

The unified theory of inequality and growth (Galor and Moav, 2004; Galor and Zeira, 1988, 1993; Galor, 2012) predicted exactly such kind of relationships. “Inequality in the distribution of income may have an adverse effect on the growth process in a non-poor economy, whereas ... inequality in poor economies may induce investment in human capital and may thus increase the long-run level of income per capita” (Galor, 2012, p.20). The model was based on a natural assumption of credit constraints (prohibiting poor individuals to borrow money for education) and the growing role of human capital (as opposed to physical capital) in the economic development process<sup>1</sup>. But it is quite obvious that these assumptions are not crucial, if there are externalities from education (social returns are greater than private returns) and the state is not compensating the private underinvestment into human capital.

However, Galor explicitly argued that “unequal distribution of land has been a hurdle for economic development. While industrialists have had an incentive to support education policies that foster human capital formation, landowners, whose interests lay in the reduction of the mobility of their labor force, have favored policies that deprived the masses of education” (Galor, 2012)<sup>2</sup>.

Our results, reported in the next sections, suggest that inequality in the distribution of land in the regions of the Russian Empire at the turn of the 20<sup>th</sup> century (the period of industrialization) had a positive effect on both the level and the evenness of the distribution of the human capital. We discuss the reasons for the divergence with Galor (2012) and Baten and Hippe (2018) studies in the last section after presenting the results.

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<sup>1</sup> “In early stages of industrialization, as physical capital accumulation was a prime engine of growth, inequality enhanced the process of development by channeling resources towards individuals whose marginal propensity to save is higher. In later stages of development, however, as human capital has become a main engine of growth, equality, in the presence of credit constraints, has stimulated human capital formation and growth” (Galor, 2012).

<sup>2</sup> “Economies in which land and other natural resources have been more equally distributed have implemented earlier public education campaigns and have benefited from the emergence of a skill-intensive industrial sector and a rapid process of development. In contrast, among economies marked by a more unequal distribution of ownership over land and other natural resources, resource abundance that was a source of richness in the early stages of development has led in later stages to under-investment in human capital, an unskilled labor-intensive industrial sector, and a slower growth process. Thus, variation in the distribution of ownership over land and other natural resources across countries has contributed to disparity in human capital formation and the industrial composition of the economy, and thus to divergent development patterns across the globe” (Galor, 2012, p. 29).

## Data

Our dependent variables are the level of human capital and inequalities in the distribution of human capital. The level of human capital is measured by the share of those with literacy skills<sup>3</sup> and average years of schooling. For measuring of the inequality in the distribution of human capital we constructed the index of inequality as the ratio of the number of residents with secondary and higher education degrees to the number of residents with primary degree (or to the average years of schooling).

There is a weak negative relationship between these indicators – provinces with higher level of literacy and years of schooling have lower inequalities in the distribution of human capital (fig. 1)<sup>4</sup>.

As explanatory variables, we used all available data on the distribution and concentration of the land (share of small and large land plots in total and private land, concentration indices, share of allotted plots in total land)), on economic and demographic conditions (density of the population, share of rural population, share of industry in employment and value added, agricultural yields, gross regional product (GRP) per capita, institutional arrangements (share of serfs before 1861, community redistribution of land practices, local governments expenditure, size of education facilities).

Below is the list of variables that turned out to be significant in our regressions with explanations.

### Distribution of land property:

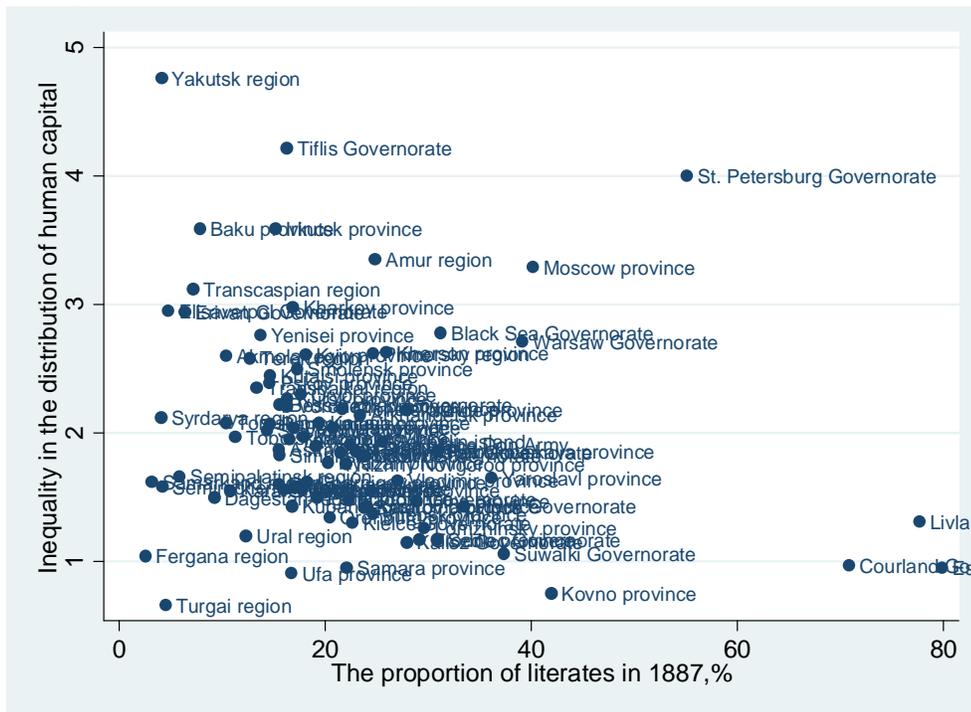
Distribution of land possessions (surveys conducted in 1877 and 1905 by the Central Statistical Committee of the Ministry of Internal Affairs published in TsSK MVD, 1880-1885, 1907) provide the data on the distribution of private land (excluding peasants' allotments owned by their agricultural communities) and all land (including these peasants' allotments).

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<sup>3</sup> Only reading skills in the native language were considered.

<sup>4</sup> In another paper (Popov, Konchakov, Didenko, 2024, forthcoming) we consider changes in the flows of human capital, namely Gross Enrollment Ratios for different levels of education from 1897 to 1914 based on (DNP, 1998) for primary education (Kessler, Markevich, 2014) for secondary and higher levels in 1897 and (Kessler, Markevich, 2020, for population in 1897; TsSK MVD, 1915, 1916, for population and education facilities in 1914).

**Fig. 1. Literacy rate and inequality in the distribution in human capital (share of inhabitants with secondary and higher degrees divided by the average number of the years of schooling) in the regions of the Russian Empire in 1897**



Source: See data section.

We used different indicators in the regressions (not all are reported, only the ones with the best results), including:

- Share of the landlords' estates of over 500 *dessiatines* (1 *dessiatine* = 1.09 hectare) in total land area in 1877 and 1905,
- Share of peasants' land holding of over 10 *dessiatines* in total peasants' land holdings in 1877,
- Share of private land holdings of less than 10 *dessiatines* in total private land in 1877,
- Share of allotted land in total land.

The Emancipation Act of 1861 gave personal freedom to serfs and land allotments were allocated to former serfs' and to the peasants that were working on the land that belonged to the state, Tsar's family and monasteries. When peasants were freed in 1861, they were given a choice of buying out land allotments (with redemption payments that were abolished only in 1907) or continuing with rent or corvée contract (abolished in 1881).

The data on railroad length and railway stations per 1 km in 1910 were extracted from the official statistics reported in TsSK MVD (1915).

Other things being equal, inequality of land distribution was observed mostly in remote regions (low density of population and railway network and relatively high GRP per capita), where the share of the peasants' allotments in total land was low (large peasants' allotments contributed to the more even land distribution) and the agricultural community did not carry out land redistribution.<sup>5</sup>

We also computed the land distribution inequality index (similar to the decile or Palma ratio) as the ratio of the area of all land holdings over 500 *dessiatines* divided by the area of landholding of less than 10 *dessiatines* for private land and for all land (table 1)<sup>6</sup>.

The highest private land distribution inequality coefficient (over 500) in 1877 was in ethnic provinces of the Empire (Baltics – Courland, Lifland, Estland and Kovno governorates, Bessarabia, Minsk, Vitebsk, Kiev governorates; no data on Caucuses and Central Asia), and in the non-ethnic, mostly Russian newly colonized regions in the outskirts of the Empire – in the North, Volga, Urals, Novorossiia regions (Olonets, Astrakhan, Samara, Saratov Ufa, Perm, Orenburg, Ekaterinoslav, Kherson; no data on Siberia and Far East) – see table 1 (highlighted in yellow). And the lowest (below 100) index of the inequality of private land distribution was observed mostly in the Central

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<sup>5</sup>  $LnINEQindex1877 = 4.0*** - 0.02**POPdENS + 0.002**GRPcap - 3.9** RAILeng1910 - 0.04**ALLOTsh1877 - 0.02**SERFshare1858 - 0.7** COMMdist1900$ ,

Robust standard errors, N=47, R<sup>2</sup> = 0.54. Here and later – standard notations: \*\*\* - significant at 1%, \*\* - 5%, \* - 10%.

*LnINEQindex1877* – natural logarithm of the index of inequality of distribution of all land in 1877;

*POPdENS* – density of the population in 1904, number of people per 1 sq. km;

*GRPcap* – GRP per capita in 1897, rubles;

*RAILeng1910* – Engel coefficient in 1910 (density of the railway network). Engel coefficient, *E*, is equal to the length of railways in the region divided by the square root of a multiple of area and population of the region:  $E = l/\sqrt{S*N}$ , where *l* is the length of the transport network, km; *S* is the area of region, thousand km<sup>2</sup>; *N* is the total population, thousands of people;

*ALLOTsh1877* – share of allotment land in total land in 1877, %;

*SERFshare1858* – share of serfs in total population in 1858;

*COMMdist1900* – The existence of a community with redistribution of allotted land in 1900. The community was an equalization institution, hindering the polarization of peasants.

<sup>6</sup> For **private land** the numerator includes private lands of the nobility, whereas the denominator does not include allotments held by peasants, normally in communal ownership. For **all land** the index includes all land holdings.

and close to Central regions of the Empire (highlighted in red in the table 1) – Archangelsk, Vladimir, Vologda, Vyatka, Grodno, Kaluga, Kostroma, Kursk, Mogilev, Moscow, Nizhny Novgorod, Novgorod, Oryol, Poltava, Pskov, Ryazan, Smolensk, Tver, Tula, Kharkov, Yaroslavl.

**Table 1. Inequalities in the distribution of private land and all land in the regions of the Russian Empire in 1877 (highlighted in yellow – provinces with highest (above 200) private land inequality index, highlighted in red – provinces with lowest (below 100) private land inequality index)**

Region	Allotment size in <i>dessiatines</i> per capita of the male population, average for the province, 1880	Inequality index for all land	Inequality index for private land	Share of allotments land in total land, %
Akmola region				
Amur region				
Arkhangelsk province	2,8	0,0	0,0	96,6
Astrakhan province	11	0,3	3545,7	79,1
Baku province				
Batumi district				
Bessarabian Governorate	4,1	1,1	221,4	53,0
Warsaw Governorate				
Vilna province	2,7	0,8	101,8	46,9
Vitebsk province	3,2	1,2	220,1	41,2
Vladimir province	3,3	0,5	30,1	58,9
Vologda province	6,2	0,5	20,9	70,0
Volyn province	2,6	1,1	100,7	45,5
Voronezh province	3,3	0,4	156,4	69,6
Vyborg Governorate				
Vyatka province	6,1	0,1	71,8	89,5
Grodno province	3,1	0,7	23,0	52,0
Dagestan region				
Ekaterinoslav Governorate	3,6	1,2	1668,5	
Elisavetpol Governorate				
Yenisei province				
Transbaikal region				
Transcaspian region				
Irkutsk province				
Kazan province	3,6	0,2	146,3	81,6

Kalisz Governorate				
Kaluga province	2,7	0,5	28,6	57,0
Kara Governorate				
Kielce Governorate				
Kyiv province	1,9	0,9	434,3	50,1
Kovno province	3,7	0,7	210,1	48,2
Kostroma province	4	1,0	42,7	42,8
Kuban region				
Courland Governorate	3,1	2,6	2567,4	0,0
Kursk province	2,2	0,3	15,8	63,7
Kutaisi province				
Livland Governorate	3	5,8	61628,0	0,0
Lomzhinsky province				
Lublin Governorate				
Minsk province	3,8	2,6	242,1	30,0
Mogilev province	3,1	1,2	76,0	40,7
Moscow province	2,9	0,4	28,8	59,7
Nizhny Novgorod province	2,9	0,6	41,1	58,3
Novgorod province	5,6	1,4	63,5	39,4
Region of the Don Army	2			
Olonets province	18,7	0,4	285,0	70,6
Orenburg province	16,2	0,2	15570,8	81,9
Oryol province	2,4	0,9	39,6	41,3
Sakhalin island				
Penza province	2,7	0,6	136,1	58,4
Perm province	6,4	2,2	20769,9	41,0
Petrokovskaya province				
Plock Governorate				
Podolsk province	1,8	0,9	176,8	50,5
Poltava province	2,2	0,6	23,9	49,4
Primorsky region				
Pskov province	3,5	0,8	36,5	43,9
Radom Governorate				
Ryazan province	2,2	0,4	23,9	
Samarkand region				
Samara province	6,2	0,9	1109,0	67,3
St. Petersburg Governorate	5,1	1,7	168,6	36,5
Saratov province	3,5	0,8	288,1	54,5
Sedlec Governorate				
Semipalatinsk region				
Semirechensk region				

Simbirsk province	2,6	0,6	139,6	56,6
Smolensk province	3,5	0,9	70,0	44,4
Stavropol province				
Suwalki Governorate				
Syrdarya region				
Tauride province	6,5	2,1	104,2	43,2
Tambov province	2,7	0,5	116,6	59,5
Tver province	3,4	0,4	12,4	58,3
Terek region				
Tiflis Governorate				
Tobolsk province				
Tomsk province				
Tula province	2	0,5	37,8	50,8
Turgai region				
Ural region				
Ufa province	8,4	1,1	820,2	73,1
Fergana region				
Kharkov province	2,6	0,4	50,6	61,3
Kherson province	3,4	1,5	2429,1	39,9
Chernigov province	2,9	0,5	33,1	54,2
Black Sea Governorate				
Erivan Governorate				
Estland province	2,1	205,7	950,2	
Yakutsk region				
Yaroslavl province	3,2	0,4	8,6	54,5

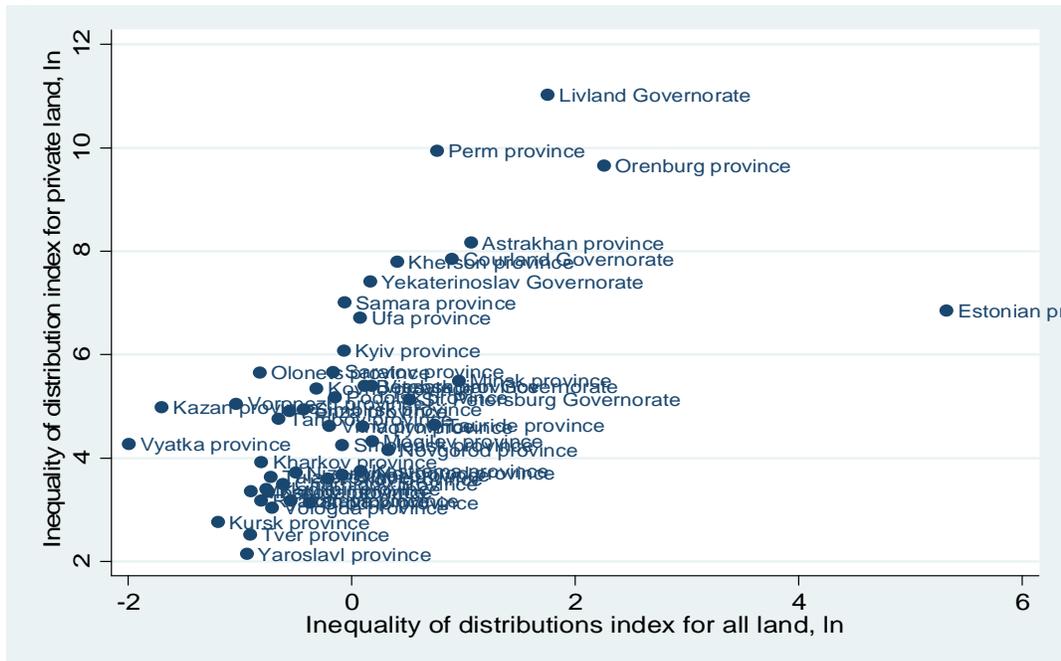
Source: Surveys conducted in 1877 and 1905 by the Central Statistical Committee of the Ministry of Internal Affairs published in TsSK MVD, 1880-1885, 1907.

Index of inequality of distribution for all land is way lower than the same index for private land, but the natural logs of two indicators are very much correlated (fig. 2) and both work in regression reported in the next section.

The share of large estates (over 500 *dessiatines*) fell in all but 3 provinces and distribution of land in 1905 became slightly more even as compared to 1877, but huge inequalities persisted. The land distribution inequality index (ratio of the area of holdings over 500 *dessiatines* to the area of holdings

below 10 *dessiatines*) increased in 1877-1905 in 9 provinces (Archangelsk, Vladimir, Vyatka, Kostroma, Moscow, Olonets, Saratov, Tauride, Estland) out of 48 (fig. 3).

**Fig. 2. Index of inequality in the distribution of all land and private land in 1877 (natural logarithms)**



Source: Computed from Table 2.

Inequality in the distribution of land (concentration indices) were higher in the non-central regions of the Empire – they had mostly low density of the population and railway network, were relatively richer than regions in the Central Russia and had low share of serfs in 1858 and little distribution of land by the community in 1900.

Demographics:

- Total number of people in the region,
- Population density,
- Share of urban population.

**Fig. 3. The inequality index of private land distribution (ratio of the area of holdings over 500 *dessiatines* to the area of holdings below 10 *dessiatines*) in 1877 and 1905**



Source: Computed from Surveys conducted in 1877 and 1905 by the Central Statistical Committee of the Ministry of Internal Affairs published in TsSK MVD, 1880-1885, 1907.

These are reported in the publications of the First General Census of the Russian Empire in 1897 (Troinitskii, ed., 1898-1905), and structured into the data set in Kessler, Markevich, 2020). The data on population in 1914 were directly extracted from the official statistics reported in TsSK MVD (1915). The data on provinces area were borrowed from the official data of the time and on the basis of processing of the original maps in Strel'bitskii, 1915; GSh, 1884, 1921, into digital GIS systems).

Level of development, structure of the economy, incomes and well-being:

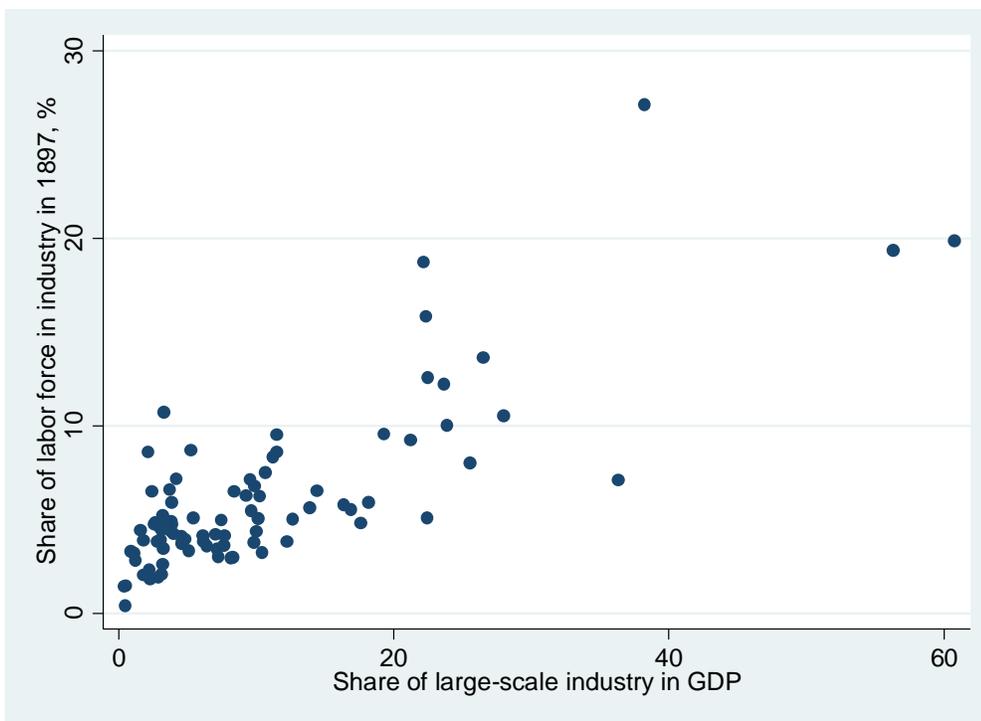
- Gross regional product per capita in 1897 (Markevich, 2019, 2022).
- Land productivity (grain yields), reported by the Central Statistical Committee of the Ministry of Internal Affairs (processed in Obukhov, 1927)<sup>7</sup>.
- The share of the labor force in industry (reported in the publications of the First General Census of the Russian Empire in 1897, and processed into the data set in Kessler, Markevich, 2020).

<sup>7</sup> Reliability of this kind of data is discussed in Kuznetsov (2012).

- The share of large industry in value added – assuming that gross output in industry was 2 times larger than value added (Markevich, 2019, 2022).

The latter two indicators – the share of industry in employment and in total value added (GRP) are correlated (fig. 4), which is how it should be, of course – it could be regarded as one more test of the quality of the data.

**Fig. 4. The share of large industry in value added and the share of employment in industry in 1897, %**



Source: See text.

Education facilities (reported in TsSK MVD, 1916):

- Number of primary and secondary schools per 100 000 inhabitants
- Number of students in education facilities per 100 inhabitants (Gross Enrollment Ratio)

Institutional environment:

- The share of serfs in the population in 1858. This is viewed as an obstacle to the accumulation of human capital and industrial development (Markevich, Zhuravskaya, 2018). It was the highest in the regions of Central Russia and in Lithuania, Ukraine and Belarus.
- The existence of a commune with redistribution of allotted land in 1900. The community was an equalization institution, hindering the migration of labor from the agricultural sector to the industrial sector (Markevich, Zhuravskaya, 2018). The redistribution of land by the commune discouraged social polarization of peasants and prevented the growth of inequalities.
- The average annual expenditures of local self-government bodies per capita in 1868-1903, in rubles. The measure captures the level of development of local self-government institutions that moderate social tensions and promote economic development (urban – *upravy*: Konchakov and Didenko, 2022; rural – *zemstva*: Markevich, Zhuravskaya, 2018). These expenditures are for all purposes (not only for education) and are in current rubles (without deflation), so should be interpreted with care.

## **Results**

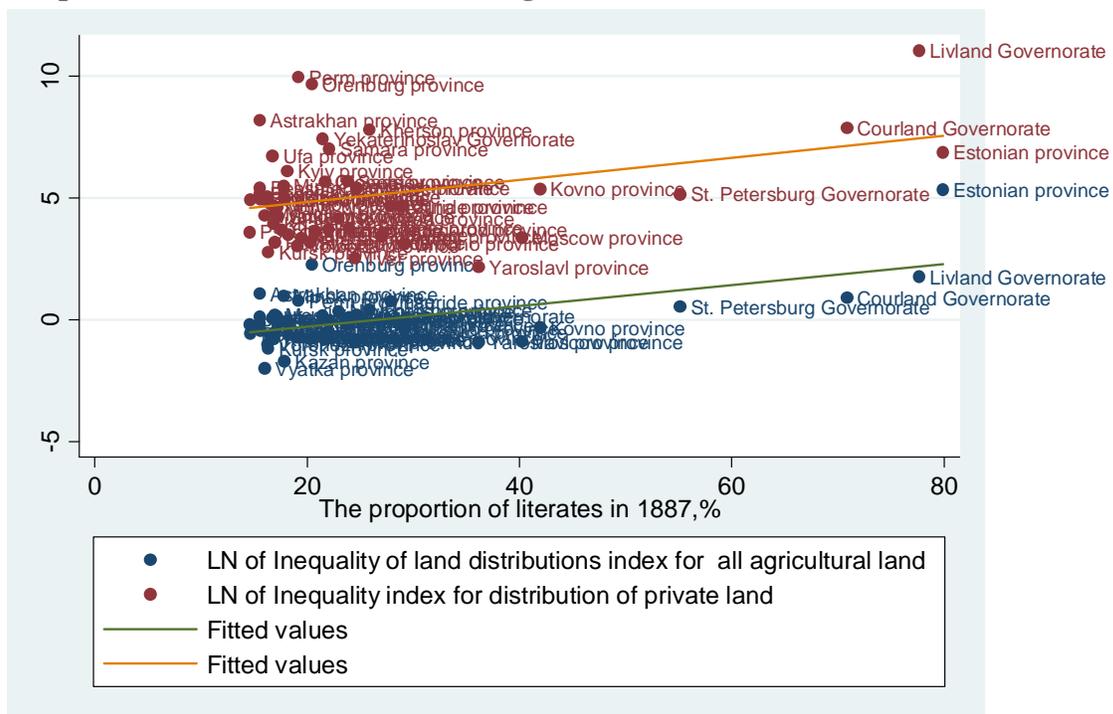
Literacy rates (as well as very close indicators of the share of inhabitants with primary education and the average number of the years of schooling) are positively correlated with the indices of inequality of distribution of all land and private land (fig. 5), whereas inequality in the distribution of human capital (percent of residents with secondary and higher levels of education / average number of years of schooling) is negatively linked with inequality in land distribution (fig. 6). Although the correlation coefficients are not high (0.3-0.6 in the first case and 0.2-0.3 in the second case), the inclusion of the control variables into the right hand side produces very robust results with high  $R^2$ .

Among the control variables are population density, level of urbanization, share of industry in employment and value added, GRP per capita, harvest yields, share of serfs in rural population before 1861, dummy for the redistribution of land in the agricultural community.

The link with the inequality in the distribution of land is positive – as regressions reported in table 2 suggest, the higher the index of inequality and the share of small (below 10 *dessyatines*) land plots,

and the lower the share of large land plots (over 10 *dessiatines*)<sup>8</sup>, the higher is the level of human capital (literacy and the average number of years of schooling). Naturally, the number of students attending primary schools per 100 inhabitants has a positive impact on the level of literacy (whereas the number of students in secondary and higher levels educational facilities is insignificant). In the next section we explain that the financing of these educational facilities was carried out mostly by the urban (not rural) local authorities and by central government and happened mostly in relatively rich periphery provinces with higher revenues of the local governments. That is why the inclusion of the *zemstvo* (local rural governments) expenditures variable turns out to be insignificant (in table 2 – not shown) or the variable even acquires the negative sign (table 3).

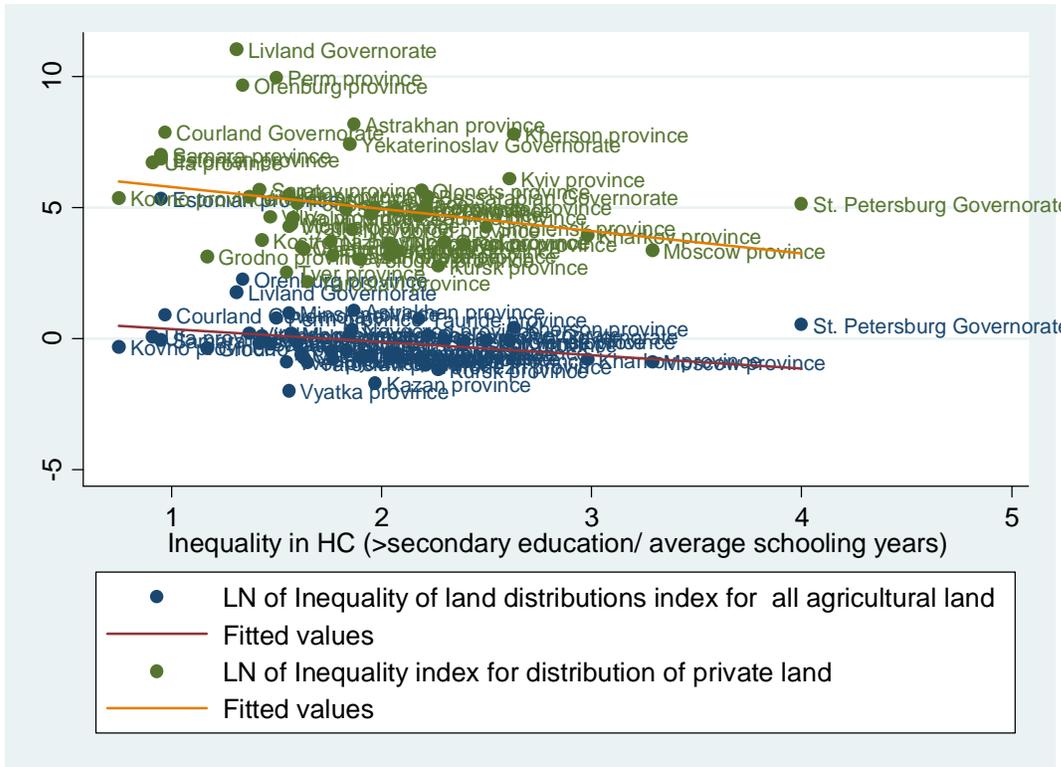
**Fig. 5. The literacy rate in 1897 (%) and the indices of inequality of distribution of all land and private land in 1877 in Russia’s regions**



Source: see data section.

<sup>8</sup> The share of small private land holdings (less than 10 *dessiatines*) in the total private land and of large peasants’ land plots (over 10 *dessiatines*) in total land characterizes polarization of the distribution of land – the higher the former and the lower the latter, the higher is inequality in land distribution.

**Fig. 6. Inequality in human capital (percent of residents with secondary and higher levels of education / average number of years of schooling) in 1897 and inequality in land distribution in Russia's regions in 1877**



Source: See data section.

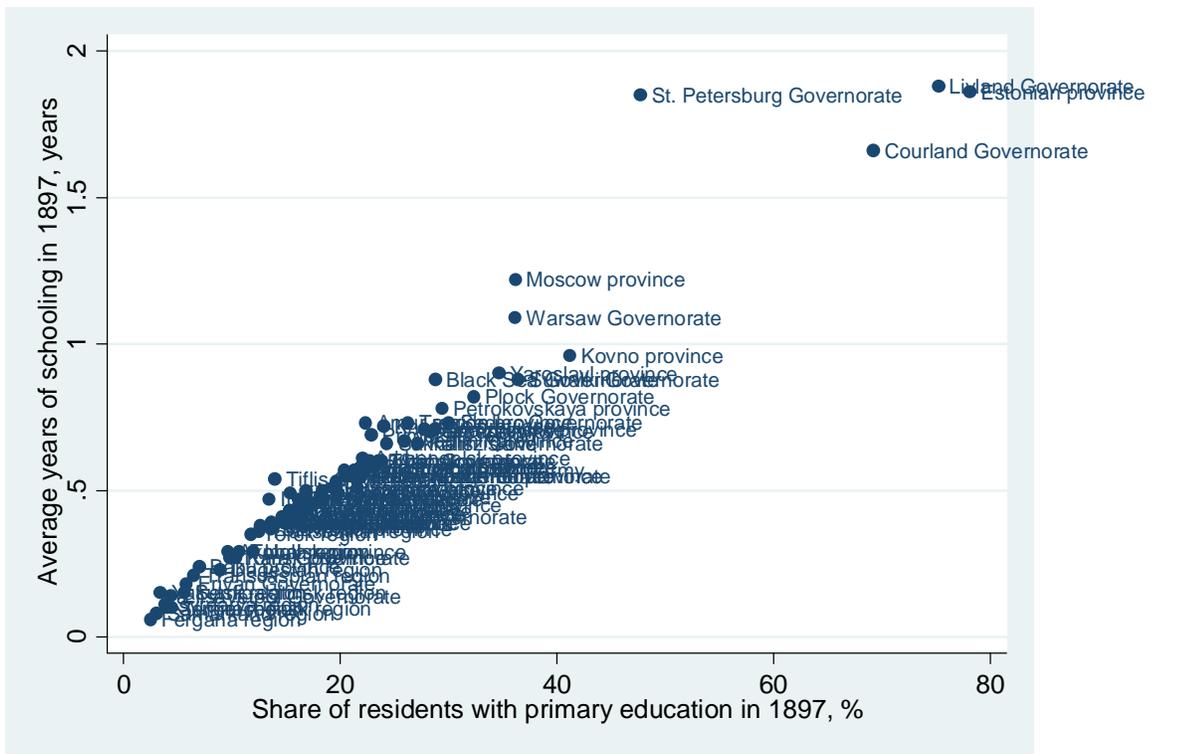
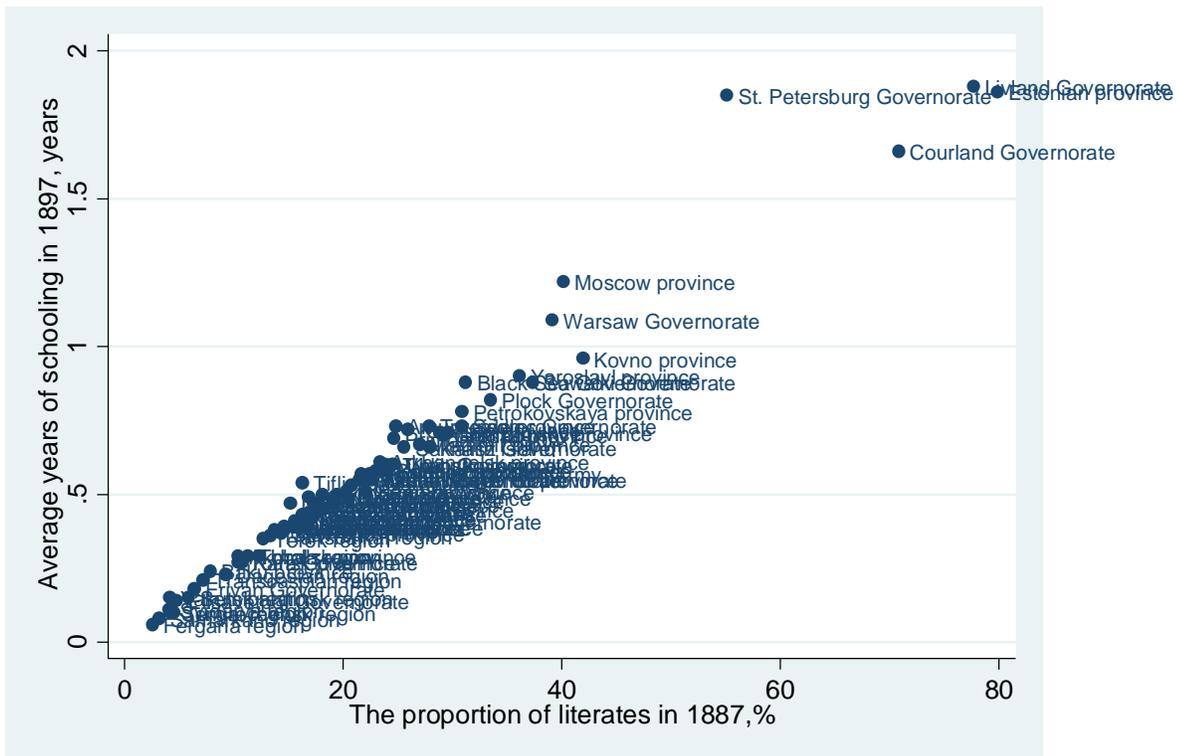
The number of the average years of schooling is very much correlated with the literacy rate and with the share of inhabitants with primary education (fig. 7), but we ran the regression with these dependent variables anyway to check the robustness of the conclusions. The results are in table 3 and they strengthen the previous statements – human capital is higher in regions with most unequal distribution of land, relatively rich regions with high urbanization, low population density, low share of serfs before 1861 and no redistribution of land by the community.

The share of land plots of over 10 *dessiatines* in total land has a negative impact on impact on educational level, whereas the share of land plots of less than 10 *dessiatines* in private land has a positive impact (polarization promotes inequality and human capital accumulation).

**Table 2. Regression of literacy rate and share of inhabitants with primary education on land inequality indices and control variables**

Dependent variable	Share of inhabitants with primary education in 1897, %			Literacy rate in 1897, %				
	1, N= 48	2, N=48	3, N = 47	3, N=48	4, N=48	5, N=48	6, N=48	8, N = 47
Index of inequality of private land distribution in 1877, times	.0003 ***	.0002 *				.0004 ***	.0001 **	
Ln of the index of inequality of all land distribution in 1877, times			3.3***					3.3 ***
Ln of the index of inequality of private land distribution in 1877, times			2.2 **	3.11 **	7.11 ***			2.1 *
Share of large peasant land holdings (more than 10 <i>dessiatines</i> ) in total land	-17.2 ***	-20.6 ***	-21.7 ***	-36.5 **	-31.4 ***	-17.6 ***	-22.0 ***	-22.1 ***
Share of small land holdings (less than 10 <i>dessiatines</i> ) in total land, %			2.3 **					2.2 **
GRP per capita in 1897, rubles	.18 ***	.13 ***				.20 ***	.19 ***	
Share of urban population, 1877, %			.6 ***	.87 ***	.76 ***			.7 ***
Share of serfs in rural population in 1858, %		-.15 **					-.13*	
Population density in 1904, inhabitants per 1 sq. km	-.22 **	-.17 **	-.2 ***	-.37 ***	-.29 ***	-.21 **	-.15 **	-.2 ***
Dummy variable for the community redistribution of land in 1900	-17.0 ***	-17.4 ***	-13.0 ***			-17.7 ***	-16.6 ***	-12.7 ***
Share of employment in industry in 1897, %		.57*						
Number of students in primary education facilities per 100 inhabitants in 1897			3.3**					3.3**
Constant	33.6 ***	39.3 ***	13.6	17.0 ***	31.4 ***	32.9 ***	37.4 ***	14.1
R <sup>2</sup> , %	74	79	85	62	73	76	79	86

**Fig. 7. Average years of schooling in 1897 and literacy rate (%) in 1897**



Source: See data section.

**Table 3. Regressions of the average number of the years of schooling on land inequality indices and control variables**

Dependent variable	Average number of the years of schooling					
	1, N= 48	2, N = 48	3, N=47	4, N = 47	5, N=48	6, N =34
Equation, N // Indicator						
Index of inequality of private land distribution in 1877, times						
Index of inequality of all land distribution in 1877, times					.003***	
Ln index of inequality of private land distribution in 1877, times	.16***	.10***	.07***	.07**		
Share of large peasants' land holdings (more than 10 <i>dessiatines</i> ) in the total land	-.8***	-.06***	-.7***	-.7***		
Share of small private land holdings (less than 10 <i>dessiatines</i> ) in the total private land, %	.11**	.07**	.07***	.07***		.02***
GRP per capita in 1897, rubles		.006***			.003**	.002***
Share of urban population, 1877, %			.03***	.03***	.01***	.02***
Share of serfs in rural population in 1858, %			-.003*	-.003**		
Population density in 1904, inhabitants per 1 sq. km			-.008**	-.007**	-.004**	-.004***
Dummy variable for the community redistribution of land in 1900			-.3***	-.3***	-.34***	
Average annual expenditures of local self-government bodies ( <i>zemstva</i> ) per capita in 1868-1903, rubles						-.06***
Number of students in primary education facilities per 100 inhabitants in 1897					.09***	.05***
Constant	-.21	-.31	.46***	.66**	.33**	.23***
R <sup>2</sup> , %	29	71	84	87	89	98

The inclusion of the *zemstvo* expenditure per person variable into the right hand side yields an unexpected result – the variable acquires the negative sign, i.e. the higher were the *zemstva* total

expenditure per capita, the lower was human capital (equation 6 in table 3). This result points out to the existence of alternative mechanism of the financing of human capital (not via *zemstva* expenditure). The number of primary school students per 100 inhabitants (flow) predictably has a positive impact on the level of human capital measured by the number of the years of schooling (stock) – equation 4,5, which means that there was another way of financing of schools except for *zemstva* financing.

To put it differently, *zemstva* most likely were doing the right thing – spending more in regions with lower educational levels, but these efforts did not succeed in increasing noticeably the level of human capital in the region. We deal with the issue in the next section (“Interpretation”), showing that human capital in relatively rich periphery regions with high inequality in land distribution was higher **because** of the educational expenditure of the central government and local city authorities, and **despite** the lower expenditure of the *zemstva*.

Table 4 reports the results of the regressions, explaining the indicators of inequality in the distribution of human capital – after the inclusion of all possible controls (urbanization and the share of industry in employment and value added, population density, GRP per capita and harvest yields, share of serfs before 1861 and community redistribution of land dummy) it turns out that more even distribution of human capital across population was associated with higher, not lower inequality in land distribution. This is true for both indicators of the evenness of the distribution of human capital that we use – share of the inhabitants with secondary and higher educational degree divided by the average number of years of schooling and the ratio of the number of inhabitants with secondary and higher degrees to those with primary degree only.

Such a relationship is not surprising – the bulk of the educational activities were taking place at the primary level (the number of inhabitants with secondary and higher educational degrees was in most regions less than 1% of the population), so the regions with higher share of inhabitants with primary education were also the regions with the low inequality in the distribution of human capital.

**Table 4. Regressions of indices of inequality in the distribution of human capital on land distribution inequality and control variables**

Dependent variable	Share of the inhabitants with secondary and higher educational degree divided by the average number of years of schooling				Number of inhabitants with secondary and higher degree to those with primary degree only	
	1, N= 49	2, N=48	3, N=47	4, N =47	5, N=48	6, N=47
Equation, N // Indicator						
Index of inequality of private land distribution in 1877, times		-.00001***			-4.6e-07***	
Ln of the index of inequality of private land distribution in 1877, times			-.07***	-.05*		-.005***
Share of small private land holdings (less than 10 <i>dessiatines</i> ) in the total private land						-.005***
GRP per capita in 1897, rubles						
Share of urban population, 1877, %	.03***	.04***	.04***	.04***	.002***	.002***
Share of serfs in rural population in 1858, %						
Population density in 1904, inhabitants per 1 sq. km	.009** *			.008***		
Dummy variable for the community redistribution of land in 1900	.9***	.9***	.9***	.8***	.03***	.03***
Average harvest yield for 10 years, c/ha (1907 year - the middle of the period)		.09**	.08**		.003**	.003**
Share of industry in GRP in 1897, %	-.008**					
Share of employment in industry in 1897, %		-.03**	-.04***	-.03***	-.001**	-.001***
Constant	.5***	.2	.6*	.8***	-.01	.02
R <sup>2</sup> , %	66	67	70	71	74	79

### Discussion and interpretation

The negative relationship between the share of land holdings larger than 50 hectares (ha) in the total land area and the level of numeracy that was found by Baten and Hippe (2018) does not mean that inequality is negatively related to numeracy. The land plots of over 50 ha, according to Baten and

Hippe, accounted on average for 37 to 65% of total land in 6 European countries (Spain, Italy, Hungary, Russia, Poland, UK) at a time. The threshold of 50 hectares is too low to characterize inequality because it includes the estates with a land area of a good half of the total. For the sake of the argument, imagine a country with very even distribution of land holdings (one half of all plots with the size of 51 hectares, the other half – 49 hectares); the share of land plots of over 50 hectares would be 51% in this case. And if the distribution would be totally even (all land plots have equal size of 51 hectares), the share of land holdings of over 50 hectares would be 100%. It is not a 100% inequality, but a 100% equality.

In 2000 the average size of the farm was 40 ha in Germany, 45 ha in France, 178 ha in the USA, 273 ha in Canada (Lowder, Skoet, Raney, 2016). The average size of collective and state farms in the USSR was several hundred hectares. A 50 hectares' land plot is just a square with a side of a 700 meters only.

To put it differently, the share of large land holdings in total land could be an indicator of high inequality only if the threshold is high enough. The 50-hectare threshold is extremely low for Europe and especially for Russia – in 1877 the estates with over 500 *dessiatines* (1 *dessiatine* = 1.09 ha) accounted for over 50% of agricultural land in all provinces except for 2 (Yaroslavl' and Archangelsk); in some provinces the share of these large estates was as high as 95% (Popov, Konchakov, Didenko, 2023).

In 1905 only in 9 provinces of European part of Russia out of 50 the share of land holdings of under 100 *dessyatines* in total private land exceeded 20%, in most provinces it was less than 10%, i.e. about 90% of total land was occupied by land estates of over 100 *dessyatines* (TsSK MVD (1907).

So, if the indicator of the share of land holdings over 50 hectares characterizes inequality, it is only in a way opposite to the Baten-Hippe interpretation. The higher the indicator, the lower is the share of land plots of less than 50 hectares (small land plots that accounted probably for only 5% or so of total private land), and the lower, not higher, the inequality in land distribution.

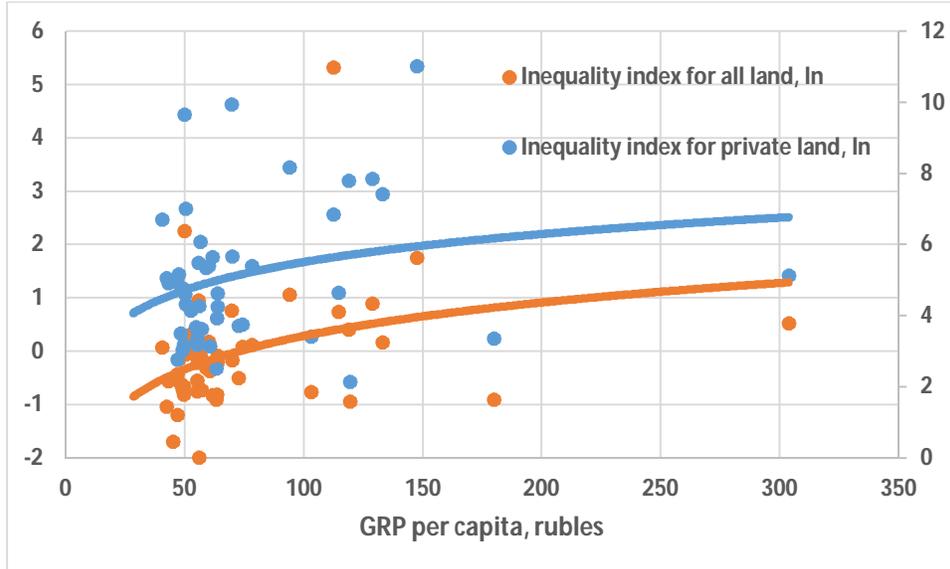
These are exactly our results – the share of land plots of over 10 *dessyatines* in total land area has a negative impact on human capital. These results support the Baten and Hippe findings, but they should be interpreted differently. Strictly speaking, it is possible to have a very even and a very uneven land distribution patterns with the same share of land plots of over 10 *dessyatines* in total land: but if the average size of the plot is well above 10 *dessyatines*, the high share of these relatively small plots is likely to point out to a greater equality in land distribution (more land in the hands of small owners – something that usually happens after the egalitarian land reform dividing large estates into small farms).

Or, to be more precise, this indicator characterizes not the inequality, but the scale of relative poverty – if all peasants have plots of over 10 *dessyatines*, there are no relatively poor peasants (with plots of less than 10 *dessyatines*). No wonder, in our regressions the stock of the human capital is negatively linked to the share of land plots of over 10 *dessyatines* (at a lower stage of development the accumulation of human capital is faster in unequal and deeply polarized societies with poverty on the one end and wealth on the other).

The anecdotal evidence of the distribution of land in Russia may be even more telling. The Russian noblemen, the Orlov brothers, for instance, after helping Catherine the Great to take the throne in 1762, were given in 1768 the huge estate on the Volga river (instead of several smaller estates in Central region) with an area of over 100,000 *dessyatines* and nearly 10,000 serfs (the area of the country of Luxemburg is only 2.5 times larger). In the Chekov's "Cherry Orchard" play the medium size estate that was sold by the landlady Ms. Ranevskaya to the industrialist Mr. Lopakhin had an area of 1100 hectares.

The regions of the Russian Empire that had high inequality in land distribution were relatively more prosperous and located not in the center, but in the periphery of the Empire (Popov, Konchakov, Didenko, 2023). Land distribution statistics is available only for the European part of the country, but for this limited sample one can observe the positive link between the level of development (GRP per capita) and the inequality in land distribution (fig. 8): in more affluent and less populous regions (periphery) inequality in land distribution was higher (see footnote 4).

**Fig. 8. Indices of inequality in land distribution (ln) in 1877 and GRP per capita in 1897, rubles**



Source: See data section.

So, the human capital was higher in the relatively prosperous regions with high inequality in the distribution of land – exactly as regressions in the previous section suggest, showing positive impact of GRP per capita, harvest yields, and inequality in land distribution on the literacy rates, years of schooling and evenness in the distribution of educational attainments among population.

The natural question, of course, is about the mechanism at work ensuring that provinces with higher inequality in land distribution had higher and more evenly distributed human capital. It does not seem to be caused by the rural local government – *zemstva* – educational activity<sup>9</sup>. If the indicator of *zemstva* expenditure per capita in 1868-1903 is added into the right hand side of the equation

<sup>9</sup> Educational activities of the *zemstva* were divided between rural (most) and (somewhat) urban areas. The former were district administrations (*uezdnye zemstva*), which dealt with rural primary schools, while provincial ones (*gubernskie zemstva*) did so with secondary, vocational and higher schools which were mostly urban (Abramov, 1996, p. 110-126). Various *zemstva* actors were vocal supporters of proliferation of education for the masses. Similar views came from the government officials, for instance Nikolai Bogolepov, rector of Moscow University in 1893, subsequently curator of Moscow educational district and Minister of Education in 1898-1901 (Alston, 1969, p. 141).

explaining the level and evenness of distribution of human capital, it acquires the negative sign or is insignificant (table 4)<sup>10</sup>.

But *zemstva* accounted for only part of the expenditure for education and this part formally was only auxiliary (Abramov, 1996, p. 26). Even though *zemstva* share was the largest part of the expenditure in the 1870s-80s, in the 1890s the share of the central government (including the Holy Synod) was increasing and exceeded that of the *zemstva* by the 1900s (Didenko, 2021, p. 137-138).

The financing of education at the turn of the century came from several sources – Ministry of Peoples’ Enlightenment, local rural authorities (*zemstva*), local urban authorities (*upravy*), fees for educational services, church authorities, charitable donation. In the regions of European part of the country the share of *zemstva* was about 1/3 of total financing with similar amounts coming from the Ministry, whereas in the Eastern regions the share of the financing from the Ministry was usually over 50%, and *zemstva* did not exist at all, even though there were *zemstva* taxes collected and managed by the central government (Didenko, 2021).

Sample data on financing of education (only for 14 regions – 8 provinces in the European part of Russia and 6 provinces in Siberia and Far East) are presented in table 5. The data suggest that total expenditures for education per capita as a rule were several times higher in Siberia and Far East than in the European regions of the country (fig. 9), and this was true for two major components of these expenditures – central government financing via the Ministry of Peoples’ Enlightenment and local city governments financing, but not the *zemstva*.

In the European provinces city authorities’ (*upravy*) share in total education expenditures did not change much over time, it was about 10% in 1870-1914 (Didenko 2021, table 8 and Table 5).

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<sup>10</sup> *Zemstva* expenditure are not linked to literacy levels, but depend positively on GRP per capita and negatively – on the share of serfs in rural population in 1858.

$ZEMSTVOexp35 = 1.3*** -.004* GRPcap - .009*SERFshare1858$ , robust standard errors, N=34, R<sup>2</sup> = 0.25. Here and later – standard notations: \*\*\* - significant at 1%, \*\*- 5%, \*- 10%.

*ZEMSTVOexp35* – average annual expenditures of local self-government bodies (*zemstva*) per capita in 1868-1903, rubles,

*GRPcap* – GRP per capita in 1897, rubles,

*SERFshare1858* – share of serfs in rural population in 1858, %.

**Table 5. Expenditure on education per capita by major sources in 14 regions of the Russian Empire in 1897, rubles**

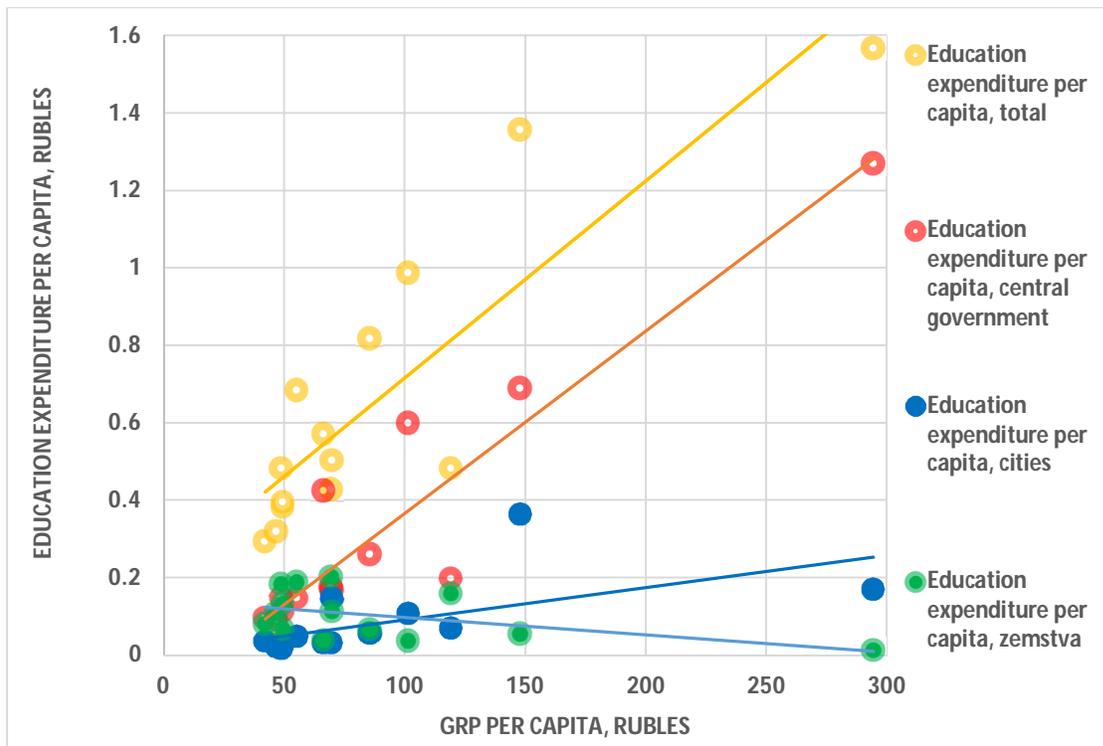
Region	Education expenditure per capita, total	Education expenditure per capita, <i>zemstva</i>	Education expenditure per capita, central government	Education expenditure per capita, cities	GRP per capita	Inequality index for all land
<b><i>European part of Russia</i></b>						
Voronezh governorate	0.29	0.08	0.09	0.04	42	0.36
Vologda governorate	0.48	0.18	0.15	0.02	49	0.49
Kaluga governorate	0.68	0.19	0.15	0.05	55	0.47
Kursk governorate	0.32	0.11	0.09	0.02	47	0.30
Perm' governorate	0.43	0.20	0.18	0.03	69	2.15
Ryazan governorate	0.38	0.13	0.03	0.03	49	0.44
Saratov governorate	0.50	0.11	0.17	0.15	70	0.85
Yaroslavl' governorate	0.48	0.16	0.20	0.07	119	0.39
<b><i>Siberia and Far East</i></b>						
Primorskiy region	1.57	0.01	1.27	0.17	294	
Amur region	1.36	0.05	0.69	0.36	148	
Yenisey governorate	0.82	0.06	0.26	0.06	86	
Tomsk governorate	0.57	0.04	0.42	0.03	66	
Irkutsk governorate	0.99	0.04	0.60	0.11	102	
Tobol'sk governorate	0.39	0.07	0.11	0.03	49	

Source: Governors' annual reports; Kessler, Markevich, 2014; numbers highlighted in red are calculated by Didenko based on model assumptions (Didenko, 2021).

In the Far East and Siberia, the central government played a greater role in financing education than in the European provinces. Also, in most of the Far Eastern and some of the Siberian provinces

institutional structure of financing education was shifted to city administrations. They were more active in proliferation and financing of schooling (especially primary) than their counterparts in European Russia<sup>11</sup>.

**Fig. 9. Educational expenditure per capita in selected regions and GRP per capita in 1897**



Source: Table 5.

Unlike *zemstva*, central government and city administrations (*upravy*) were spending money in relatively well-off regions with high inequality in land distribution, and their spending resulted in relatively higher levels of human capital in these regions.

Why the central government and the city authorities were spending more money per capita on education in relatively prosperous regions with already high levels of educational attainments? Galor (2012, p. 44) is citing Johnson (1969), claiming that large land owners were not interested in the education of the peasants (trying to keep them in the villages) unlike industrialists that were interested

<sup>11</sup> See e.g. Shilov (2008, p. 20, 418-420).

in educated labor force in the cities<sup>12</sup>. It could be true, but their interests did not determine the financing flows in any case. Neither the central government budget, nor city finances were dependent on land taxes. In 1897 only 3% of total tax revenues of the government budget came from land taxes, whereas over 1/3 of all tax revenues were collected from the excise tax on alcoholic beverages (Shatsillo, 2003, table 2).

In contrast, *zemstva* revenues came from taxation of real estate property (most) and entrepreneurial activities (a lot) with certain ceiling limits established by the central government (Abramov, 1996, p. 14-15, 20-21; Naftziger, 2011, p. 400).

To put it differently, there was a lack of pro-active education policy before the first Russian revolution, the government mostly relied on the market in the formation of human capital. Various levels of governments (except for *zemstvo* that were created in 1864 and by 1914 existed in rural areas of 43 regions of European Russia) were going with the grain, spending money on education in relatively wealthy provinces, where the revenues of the budgets were higher. And, as was argued previously, these were exactly the periphery provinces with the high inequality in land distribution.

*Zemstvas* were created to bridge the gap that emerged between the government and the rural areas after the abolition of serfdom and the loss of the gentry's control over the village. The rural elections were designed to ensure the pre-dominance of large rural landowners at the expense of the peasantry and towns. However, the *zemstva* staff was hired from gymnasium and university graduates, i.e. not from the gentry, but from the "third estate" (Alstom, 1969, p. 59; Eklof, 1986, p. 55-56, 61-62).

In the 20<sup>th</sup> century (and perhaps even since the 1890s<sup>13</sup>), especially after the first Russian revolution, the government stepped up its efforts in the formation of human capital – in 1908-12 the discussions in the State Duma (created during the first Revolution) resulted in the decision to introduce obligatory

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<sup>12</sup> "Provincial councils dominated by wealthier landowners were responsible for their local school systems and were reluctant to favor the education of the peasants (Johnson, 1969)" (Galor, 2012, p. 44). Similar pattern for the period of the 1860s-80s is thoroughly documented in (Eklof, 1986, p. 72-83).

<sup>13</sup> "A revolution in school finances occurred in the 1890s, the result of a joint government-zemstvo endeavor— both had given low priority to popular education until 1890, but both moved rapidly after that date to bring about universal education." (Eklof, 1986, p. 88).

primary education in the European part of Russia – by 1918, and in the whole Empire – by the end of the 1920s. The bill was finally voted down by the State Council<sup>14</sup>, but the number of primary schools and gymnasiums in 1897-1914 increased 1.6 times, the number of schoolchildren – 2.1 times<sup>15</sup>, the number of secondary schools and gymnasiums – 2.0 times, the number of schoolchildren in them – 2.5 times<sup>16</sup>. The share of the entire population that was actively attending schools increased threefold from 1.7% in 1897 to 5.7% in 1915 (Dennis, 1961).

Also, the education expenditures of *zemstva* has grown significantly: their share in the total expenditures increased from 7.7% in 1871 to 28.1% in 1913 (Naftziger, 2011, p. 400). The level of representation of the peasant curia had a positive effect on the level of *zemstvo* expenditures on education (Naftziger 2011, p. 415-431).

Even so, by 1914 Russia was very much behind European countries in this respect – the number of school attendees was only 59 per 1000 inhabitants as compared to 143 in Austria, 152 in Great Britain, 175 in Germany, 213 in the US, 148 in France, 146 in Japan (Mironov, 2018, p. 759).

But in 1897, when the government was going largely with the flow, and its educational expenditure were determined by the relative incomes of the regions in question, human capital formation was proceeding slowly and mostly in rich regions with high inequality in land distribution.

This picture is consistent with other research on human capital in the Russian regions at the turn of the 20<sup>th</sup> century. The paper by Popov, Konchakov and Didenko (2023) finds a positive correlation between the growth of social protest before the first Russian revolution and the inequality in land distribution. It turns out that all three indicators of the unrest – increase in peasants' uprising, strikes at industrial enterprises and crimes against persons – were higher in the regions with high inequality in the land distribution. These were mostly the provinces of the periphery of the Empire, with

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<sup>14</sup> About the discussion of the bill and its legislative track see Santa Maria (1990, p, 56-57).

<sup>15</sup> As it follows from the data in DNP (1898) and TsSK MVD (1916).

<sup>16</sup> As it follows from the data in Kessler and Markevich (2014) and TsSK MVD (1916).

generally higher GRP per capita and incomes than in the center and with a higher level of human capital (literacy and average years of schooling).

Whereas literacy had a negative effect on the increase in domestic violence, it had either a significant positive effect on social unrest (increase in strikes) or was insignificant (increase in peasants' unrest). Success rate of strikes, though, was linked positively with education (literacy rate and the average number of years of schooling) in 1895-99, but in 1900-04 the relationship was negative: in the late 19<sup>th</sup> century strikes were successful mostly in educated regions, whereas in 1900-04 less educated regions became successful in their strikes' activity as well.

### **Conclusions**

The major result of this paper is different from many studies of inequality and human capital. We find that in the regions of Russian Empire in 1897 the uneven distribution of land was associated with higher levels of human capital (as measured by the average years of schooling and literacy rate), whereas the distribution of the human capital across the regional population (as measured by the proportions of inhabitants with higher, secondary and primary education) was more even.

Regions with higher human capital were located mostly in the periphery of the Russian Empire, were relatively well-off (higher agricultural yields and higher per capita incomes) and had higher per capita educational expenditure financed by the central government and local city authorities.

We interpret the results in the framework of the unified theory of the inequality and growth: at low levels of development (industrialization stage) greater inequality in asset distribution and related inequality in incomes lead to the increase in the savings rate and encouraged investment into physical and human capital, thus stimulating incomes and growth. Higher incomes in turn yielded higher revenues for the central and local governments, so expenditure for education also rose.

It was not local *rural* authorities – *zemstva* – that managed to increase the level of human capital: even though they were spending more per capita in regions with low level of education, these spending did not make much of a difference – human capital in these regions remained low.

This insight can add an important argument to the debates of the time – whether *zemstva* could transform Russian communal pre-capitalist village into the capitalist “American type” farming or whether the *zemstva* activities were just a palliative care that did not affect the root causes of inequality. *Narodniks* (one group of socialist reformers) believed that transition to socialism was possible through the agricultural community and *zemstva* activities, whereas Marxists (social democrats at the time) considered a revolution a *sine qua non* for social progress<sup>17</sup>.

The revealed link between the inequality and human capital is in line with previous research showing that higher land inequality was associated with more advanced capitalist transformation of the rural social structures (buyouts of community land by the peasants and purchases of the land of the nobility by merchants and industrialists), higher social protest and higher human capital (Popov, Konchakov, Didenko, 2023).

### References

Abramov, V.F. (1996). Абрамов В.Ф. Российское земство: экономика, финансы, культура [*The Russian zemstvo: Economy, finance, and culture*]. Moscow: ФГ «Ника» [*Nika Financial Group Publishing*], 1996.

Alston, P.L. (1969). *Education and the State in Tsarist Russia*. Stanford, CA: *Stanford University Press*.

Andersen, Torben M. (2015). Human Capital, Inequality and Growth. - *European Commission Directorate-General for Economic and Financial Affairs*. 2015

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<sup>17</sup> As the main character in Anton Chekhov’s famous short story “The House with the Mezzanine” (1896) argues: “medical stations, schools, libraries, pharmacies, under existing conditions, only lead to slavery. The masses are caught in a vast chain: you do not cut it but only add new links to it”. Although the line of his argument did not lie in the realm of economic materialism, as Marxism was then commonly perceived, it borrowed much from thoughts and disputes of Marxist-influenced intelligentsia of the time. Later on, during the Russian Revolutions of 1917 and the Civil War, this debate transformed into the political struggle between *socialist revolutionaries* (*essers*, former *narodniks*), and *bolsheviks*.

Baten, Joerg, Ralph Hippe (2018). Geography, land inequality and regional numeracy in Europe in historical perspective. *Journal of Economic Growth* 23: 79–109. <https://doi.org/10.1007/s10887-017-9151-1>.

Becker, G. S., & Chiswick, B. R. (1966). Education and the distribution of earnings. – *American Economic Review*, 56, 358-369.

Castelló, A., Doménech, R. (2002). Human Capital Inequality and Economic Growth: Some New Evidence. - *The Economic Journal*, Vol. 112, No 478, pp. 187-200.

Cook, Christopher J. (1995). Savings rates and income distribution: further evidence from LDCs. - *Applied Economics*, Volume 27, 1995, [Issue 1](#), pp. 71-82.

De Gregorio J., Lee J.-W. (2002). Education and Income Inequality: New Evidence from Cross-country Data. *Review of Income and Wealth*, Vol. 48, No 3, pp. 395-416.

Deininger, Klaus, Lyn Squire (1998). New ways of looking at old issues: inequality and growth. – *Journal of Development Economics*, Volume 57, Issue 2, 1998, Pages 259-287.

Dennis, G. (1961). Education, in M. T. Florinsky (ed.), *Encyclopedia of Russia and the Soviet Union*. New York, NY: McGraw-Hill.

DNP (1898). Департамента народного просвещения [Department of Public Education]. *Статистические сведения по начальному образованию в Российской империи за 1896 год* [Statistical data on primary education in the Russian Empire in 1896]. St. Petersburg.

Didenko, Dmitry (2021). Диденко Д.В. Динамика и институциональные источники накопления человеческого капитала в регионах России (вторая половина XIX в. - начало XX в.) [Dynamics and institutional sources of human capital accumulation in Russia's regions (19th — early 20th centuries)] – *Экономическая история: ежегодник* [Russian Economic History Yearbook]. 2020,

Moscow: *Российская политическая энциклопедия (РОССПЭН) [Russian Political Encyclopedia (ROSSPEN)]*. P. 107-149.

Easterly, William (2007). Inequality does cause underdevelopment: Insights from a new instrument. – *Journal of Development Economics*, Volume 84, Issue 2, November 2007, Pages 755-776.

Eklof, B. (1986). Russian peasant schools. Officialdom, village culture and popular pedagogy, 1861 – 1914. Berkeley, CA: *University of California Press*.

Földvári, P. and Van Leeuwen, B. (2011). Should less inequality in education lead to a more equal income distribution?, *Education Economics*, Vol. 19, No. 5, pp. 537-554.

Galor, O. and Zeira, J. (1988). Income Distribution and Investment in Human Capital: Macroeconomics Implication. Working Paper No. 197, *Department of Economics, Hebrew University*.

Galor, O. and Zeira, J. (1993). Income Distribution and Macroeconomics, *Review of Economic Studies* 60(1): 35-52.

Galor, Oded (2012). Inequality, Human Capital Formation and the Process of Development. *IZA Discussion Paper* No. 6328. January 2012.

Gregorio, Jose De, Jong-Wha Lee (1999). Education and Income Distribution: New Evidence From Cross-Country Data. – *The Review of Income and Wealth*, Volume 48, Issue 3, September 2002, Pages 395-416.

GSh (1884). Военно-топографический отдел Главного штаба [*Military Topographic Department of the General Staff*]. Карта Азиатской России с прилегающими к ней владениями [*Map of Asian Russia with adjacent possessions*]. St. Petersburg.

GSh (1921). Военно-топографический отдел Главного штаба [Military Topographic Department of the General Staff]. *Военно-дорожная карта Азиатской России. Составлена в 1895 г. Исправлена в 1908-19 гг.* [Military road map of Asian Russia. Compiled in 1895, corrected in 1908-19]. Moscow.

Johnson, W. (1969). *Russia's Educational Heritage*. 2<sup>nd</sup> ed., New York: Octagon Books.

Kaldor, N. (1955). Alternative Theories of Distribution. – *Review of Economic Studies*, 23(2): 83-100.

Kessler, H., Markevich, A. (2014). Electronic archive of Russian Historical Statistics, 18th – 21st centuries. Version 1. Datatype 5.02 – Output of the service sector (natural units), benchmark year 1897 [ERRHS\_5.02\_data\_1897.xlsx]. <http://ristat.org>.

Kessler, H., Markevich, A. (2020). Electronic archive of Russian Historical Statistics, 18th – 21st centuries. Version 1. [Topic 1-Population]. <http://ristat.org>.

Konchakov R.B., Didenko D.V. (2022). База данных «Данные исторической статистики по человеческому капиталу, экономическому развитию и урбанизации за 1904 г. в Российской империи (включая количество учебных заведений и количество учащихся за указанные периоды)» [Database "Data of historical statistics on human capital, economic development and urbanization for 1904 in the Russian Empire (including the number of educational institutions and the number of students for the indicated periods)"]. Certificate No. 2022620024. <https://elibrary.ru/item.asp?id=47779072>.

Kuznetsov I.A. (2012) Русская урожайная статистика 1883-1915 гг.: источник в контексте историографии [Russian crop statistics 1883-1915: source in the context of historiography]. In Borodkin L.I., Petrov Yu.A., Salomatina S.A. (Eds). Экономическая история [Russian Economic History Yearbook]. 2011/2012. Moscow: Российская политическая энциклопедия (РОССПЭН) [Russian Political Encyclopedia (ROSSPEN)]. P. 190-228.

Lee, J.-W. and H. Lee (2018). Human Capital and Income Inequality. ADBI Working Paper 810. Tokyo: *Asian Development Bank Institute*. Available: <https://www.adb.org/publications/human-capital-and-income-inequality>.

Mincer (1974). Schooling, Experience, and Earnings. *NBER*, 1974.

Lower, Sarah K., Jakob Skoet, Terri Raney (2016). The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide. *World Development*, Volume 87, November 2016, pp. 16-29.

Markevich, Andrei (2019). A Regional Perspective on the Economic Development of the late Russian Empire (May 14, 2019). Available at SSRN: <https://ssrn.com/abstract=2555273> or <http://dx.doi.org/10.2139/ssrn.2555273>.

Markevich, Andrei, 2022, "GRP estimates for the provinces of the Russian Empire in 1897", <https://hdl.handle.net/10622/ZNA2NP>, IISH Data Collection, V3; Markevich GRP estimates for the provinces of the Russian Empire in 1897.csv.

Markevich A., Zhuravskaya E. (2018). The Economic Effects of the Abolition of Serfdom: Evidence from the Russian Empire. *American Economic Review*, Vol. 108, No. 4-5, pp. 1074-1117. <https://doi.org/10.1257/aer.20160144>.

Mironov B.N. (2018). Российская империя: от традиции к модерну. [*The Russian Empire: from Tradition to Modernity*]. Vol 3. 2nd ed. St. Petersburg: Дм. Буланин.

Naftziger, S. (2011). Did Ivan's Vote Matter? The Political Economy of Local Democracy in Tsarist Russia, *European Review of Economic History*, Vol. 15, No. 3, pp. 393-441.

Obukhov V.M. (1927). Движение урожаев в Европейской России в период 1883 - 1915 гг. [*The movement of crops in European Russia in the period 1883 – 1915*]. In Groman V.G. (ed.). Влияние

неурожаев на народное хозяйство России. [*The impact of crop failures on Russia's national economy*]. Part 1. Moscow. Prilozhenie 1 [Appendix 1], pp. 59-108.

Popov, Vladimir (2012). Попов В.В. Почему Запад разбогател раньше, чем другие страны и почему Китай сегодня догоняет Запад? Новый ответ на старый вопрос [*Why the West got rich before other countries and why china is catching up with the West today? New Answer to the old question*]. – Журнал Новой экономической ассоциации [*Journal of the New Economic Association*], №3 (15), 2012.

Popov, V. (2014). Mixed Fortunes: An Economic History of China, Russia and the West. *Oxford University Press*, April 2014.

Popov, V., R. Konchakov, D. Didenko (2023). Factors of social tension in the provinces of the Russian Empire in the late 19th and early 20th centuries. – *MPRA Paper No. 118464*, Sept. 2023 (co-authored with Roman Konchakov and Dmitry Didenko). <https://mpra.ub.uni-muenchen.de/118464/>.

Popov, V., R. Konchakov, D. Didenko (2024, forthcoming). Increase in the human capital in the regions of the Russian Empire in 1897-1914 and inequality in land distribution.

Santa Maria, P. (1990). Question of Elementary Education in the Third Russian State Duma (1907-1912). Lewiston, N.Y.: *The Edwin Mellen Press*..

Shatsillo, M.K. (2003). Шацилло, М.К. (2003). Эволюция налоговой системы России в XIX веке [Evolution of Russia's taxation system in the 19<sup>th</sup> century] - *Экономическая история. Ежегодник. [Russian Economic History Yearbook]*. 2002. Moscow: *Российская политическая энциклопедия (РОССПЭН) [Russian Political Encyclopedia (ROSSPEN)]*. P. 345—383).

Shilov, A. (2008). Шилов А.И. Начальная и средняя школа Восточной Сибири в конце XIX - начале XX вв. [Primary and secondary school in the late 19<sup>th</sup> – early 20<sup>th</sup> centuries] Krasnoyarsk: *Krasnoyarsk Astafiev State Pedagogical University Publishing*.

Strel'bitskii I.A. (1915). Специальная карта Европейской России [*Special map of European Russia*] (1:420,000). 1865-1871. Petrograd: Литография картографического заведения Военно-топографического отдела [*Lithography of the Cartographic Establishment of the Military Topographic Department of the General Staff*].

Troinitskii N.A., ed. (1898-1905). Первая всеобщая перепись населения Российской империи 1897 г. [*The First General Census of the Population of the Russian Empire in 1897*. Vols. 1-50, 65, 67, 68, 70, 72-80 [in Russian] St. Petersburg: Центральный статистический комитет Министерства внутренних дел [*Central Statistical Committee of the Ministry of Internal Affairs*].

TsSK MVD (1880-1885). Центральный статистический комитет Министерства внутренних дел [Central Statistical Committee of the Ministry of Internal Affairs]. Статистика поземельной собственности и населенных мест Европейской России: по данным обследования, произведенного статистическими учреждениями Министерства внутренних дел, по поручению Статистического совета [*Statistics on land ownership and settlements in European Russia: according to a survey conducted by the statistical offices of the Ministry of Internal Affairs, commissioned by the Statistical Council*]. St. Petersburg.

TsSK MVD (1907). Центральный статистический комитет Министерства внутренних дел [Central Statistical Committee of the Ministry of Internal Affairs]. Статистика землевладения 1905 г. Свод данных по 50 губерниям Европейской России [*Land ownership statistics in 1905. Compilation of data on 50 provinces of European Russia*]. St. Petersburg.

TsSK MVD (1915, 1916). Центральный статистический комитет Министерства внутренних дел [Central Statistical Committee of the Ministry of Internal Affairs]. Статистический ежегодник России за 1914 г., 1915 г. [*Statistical Yearbook of Russia*]. Petrograd.

Zvereva, K., V. Zverev (2013). Зверева К.Е., Зверев В.А. Как Сибирь училась читать: школа, грамотность и книга в русской деревне конца XIX – начала XX в. [*How the Siberia learned to*

*read: school, literacy, and book in the Russian village in the late 19<sup>th</sup> – early 20<sup>th</sup> centuries]*  
Novosibirsk: *Novosibirsk State Pedagogical University Publishing*, 2013.

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